Principled Technologies®

TEST REPORT
NOVEMBER 2006

# Performance on Microsoft Windows Vista of Intel vPro technology-based and AMD processor-based PCs in common business scenarios

## Executive summary

Intel Corporation (Intel) commissioned Principled Technologies (PT) to compare the performance on Microsoft Windows Vista of an Intel vPro technology-based PC with an Intel Core 2 Duo processor E6700 with that of an AMD Athlon 64 X2 5200+ processor-based PC. We tested five scenarios that featured real-time collaboration and communication with Microsoft Office 2007 applications, business intelligence and predictive modeling using Microsoft Office Excel 2007 and Intuit QuickBooks Pro 2006, and new interface features of Windows Vista. We compared the performance of two platforms on these scenarios:

- Intel vPro technology featuring an Intel Core 2 Duo processor E6700 on an Intel DQ965GF motherboard
- AMD Athlon 64 X2 5200+ processor on an ASUSTek M2NBP-VM CSM motherboard

### KEY FINDINGS

- The Intel® vPro™ technology based PC with the Intel® Core™ 2 Duo processor E6700 yielded significant performance advantages over the AMD Athlon 64 X2 5200+ processor-based PC on our business tests.
- The Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700 finished the tasks in our tests on average 1.45 times faster than the AMD Athlon 64 X2 5200+ processor-based PC.
- The Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700 also delivered better slideshow transitions and higher HD video playback quality in our dual-monitor test.

Figure 1 shows the normalized results for the foreground tasks, the ones on which users typically wait for the system to respond, on the four test scenarios with numerical results. As it shows, the Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700 outperformed the AMD Athlon 64 X2 5200+ processor-based system in all the test scenarios.

The Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700 was from 1.14 times to 2.21 times faster on our foreground and background tasks than the AMD Athlon 64 X2 5200+ processor-based PC and averaged 1.45 times faster across all the tasks. (In all comparisons in which we cite the average of task times, we

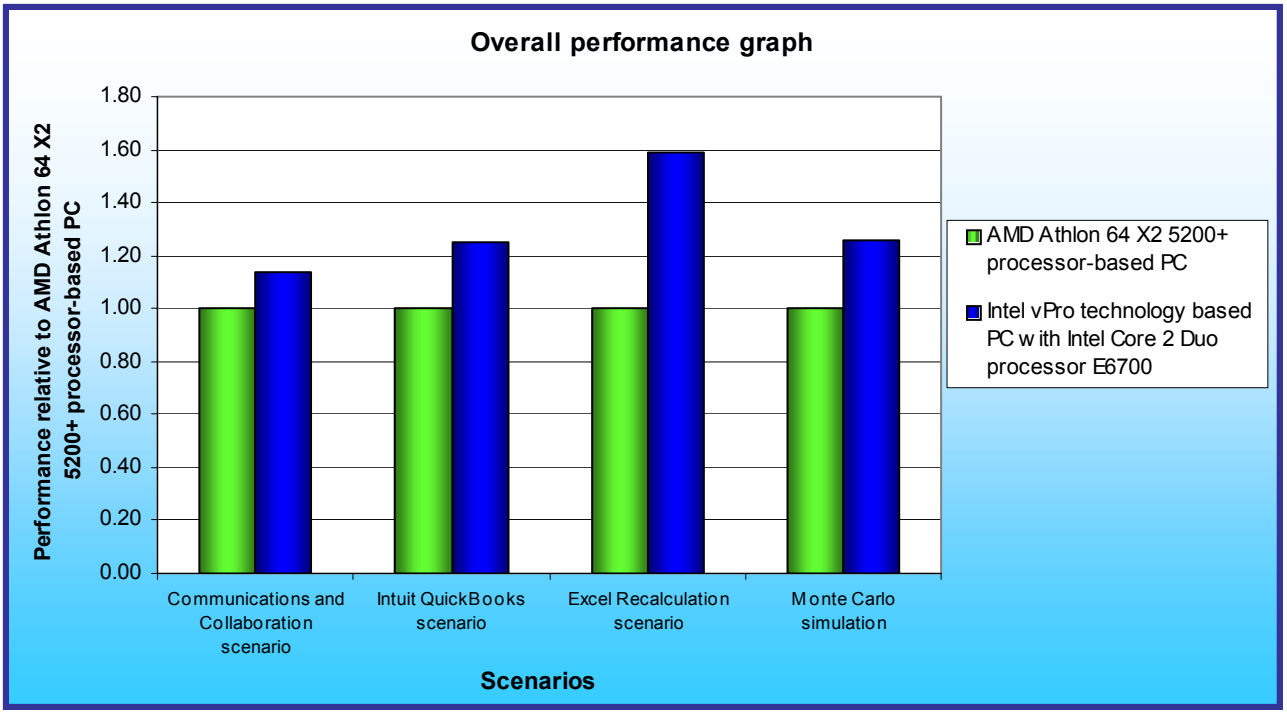



**Figure 1: Normalized results for the foreground tasks on both test systems on four scenarios. Larger numbers indicate better performance.**

use the geometric mean of the normalized times for each task.)

These performance improvements typically translated into time savings that users would notice and appreciate. For example, the longest background task took 50.39 seconds on the AMD Athlon 64 X2 5200+ processor-based PC but only 22.79 seconds--almost 28 seconds faster--on the Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700.

So that we could make the two test systems as similar as reasonably possible while varying the processors and motherboards, we built the systems rather than purchasing them from vendors. Intel specified the general system types and supplied the processors and motherboards. We purchased common such components as RAM, hard disks, and optical drives. Each test system had the following basic components (see Appendix A for detailed configuration information):

- 1GB of the fastest RAM its motherboard supported
- 80GB hard disk with an 8MB buffer (SATA)
- DVD-RW optical drive
- Microsoft Windows Vista Ultimate

We used the following common office and collaborative applications, which we list in alphabetical order:

- Intuit QuickBooks Pro 2006
- Microsoft Office Excel 2007
- Microsoft Office Groove 2007 (available only in Microsoft Office Enterprise 2007 Edition)
- Microsoft Office Outlook 2007
- Microsoft Office Word 2007
- Microsoft Windows Media Player 11
- Microsoft Windows Photo Gallery Slideshow

The application scenarios we tested included such common functions as:

- Opening files
- Editing files
- Receiving email
- Syncing Microsoft Groove workgroup content
- Recalculating Excel spreadsheets
- Viewing a slideshow
- Playing HD videos

In the following sections we look more closely at our test application scenarios (Application scenarios), examine the results of our tests (Test results and analysis), and give detailed information about how we actually performed the tests (Test methodology). In the appendices, we present the configurations of the test systems and explain how to manually execute the application functions in our scenarios.

## Application scenarios

We chose five scenarios that involve common office applications, predictive modeling and business intelligence tasks, and new features of the Windows Vista Aero user interface. Three of the scenarios involve Microsoft Office 2007 applications, two of which focus on Microsoft Office Excel 2007 tasks. A fourth scenario employs Intuit QuickBooks Pro 2006, an application common in small and medium businesses. The final scenario includes subjective quality assessments of how well each PC delivered on Windows Vista user interface capabilities. Some scenarios involve a single task, while others involve multiple tasks running at the same time. In the multitasking scenarios, we time both the foreground task (FG), which is typically a function that users initiate and wait for the system to complete, and the background task (BG), which is usually a function users start and then leave to run while they do other work.

### Communications and collaboration scenario: Opening a compressed Outlook message attachment, an XML file, in Microsoft Word 2007 while a Microsoft Groove 2007 workspace synchronization runs

Sheila Craig, an IT manager, is working on an internal audit of the systems at the Acme Academics grading center. She has Microsoft Outlook running on her PC so she can receive an email she is expecting from her co-worker, Jenny. Sheila checks her email and sees that Jenny has sent her the file she needs to study. The file is an XML document that shows the advantages of some of the system upgrades Jenny is recommending for the grading center. At the same time, someone has added a large group of files to the IT department's Microsoft Groove workspace. While Sheila is opening the attached zip file, Groove begins to automatically synchronize her machine with the workspace. While the Groove synchronization runs in the background, Sheila opens Jenny's XML document in Word to study its contents.

We timed:

- the XML file open (FG) from when Sheila presses Enter to open the attached XML file until the file open completes
- the Microsoft Groove sync (BG) from when Microsoft Office Groove 2007 launches until the content sync countdown disappears

### Viewing a set of memorized reports in Intuit QuickBooks Pro 2006

Mark Owens is in charge of examining the books of a company, Rock Castle Construction, that his firm is interested in acquiring. He instructs his accountant to go through Rock Castle Construction's Intuit QuickBooks data file and prepare multiple memorized reports for him to review. When Mark receives the QuickBooks file from his accountant, he loads the file onto his system. He then opens the set of memorized reports to view Rock Castle's overall performance since its inception.

We timed:

- the appearance of the Intuit QuickBooks Pro 2006 reports from when Mark clicks Display until all the report windows are open

### Recalculating business revenue using Microsoft Office Excel 2007

Brian Corcoran is a forensic accountant investigating a failed business that is the plaintiff in a shareholder class-action suit. He is examining the original spreadsheet the business used to estimate revenues over five years of its telecommunications services. The spreadsheet calculates revenues based on the number of T1 trunks and customers and the penetration of voice, call management, and multimedia services. Brian recalculates the Excel spreadsheet to see how the various models it employs compare to the actual revenues of the company.

We timed:

- the Microsoft Excel 2007 calculation from when Brian presses F9 in Excel to start the recalculation until the recalculation percentage indicator reached 100 percent and closed

## Running a Monte Carlo simulation in Microsoft Office Excel 2007

Jordan Michaels, a GMC auto dealer, believes that demand for new Envoys will be normally distributed with a mean of 200 and standard deviation of 30. His cost of receiving an Envoy is $25,000, and he sells an Envoy for $40,000. He can sell half of all the leftover Envoys for $30,000. He is trying to decide how many Envoys to order, so he builds a spreadsheet with models of orders of 200, 220, 240, 260, 280, and 300 Envoys. Jordan is able to calculate the number of Envoys he should order for his dealership by using a Monte Carlo simulation that runs on Microsoft Office Excel 2007.

To take advantage of publicly available data, we started with a Monte Carlo spreadsheet from Microsoft's Web site. (Adapted from Winston, W.L. (2004): *Microsoft® Excel®: Data Analysis and Business Modeling*. Washington: Microsoft Press, p. 462.) To make this initial spreadsheet more like one a real business might use, we added additional worksheets for each quantity of vehicles--200, 220, 240, 260, 280, and 300--that the dealer is considering purchasing.

We timed:

- the Microsoft Excel 2007 calculation from when Jordan presses F9 in Excel to start the recalculation until the Data Table indicator on the Status Bar goes away

## Dual-monitor Windows Vista Aero scenario: Viewing a slideshow while an HD video plays

Andy Granton is a program manager at the Melcore Robotics Company. He has two monitors attached to his PC so he can multitask more efficiently. Andy has the job of developing a video to showcase his company's actuator arms. He's considering Web based HD video that looks very high-tech, so he visits Microsoft's Web site and checks out an HD video promo for HD WMV. He watches the windowed video on one monitor, while on the other he has open some photos for a candidate location for a video shoot. While the Microsoft demo video plays, he uses Windows Photo Gallery to open the folder of JPEG pictures into list view and then clicks slideshow to get a rotating show of the images.

We analyze the quality of the slideshow transitions, which use a fade effect between photographs, and note whether those transitions are smooth or choppy. We also check the quality of the HD video playback on each system.

For more details on how we executed and measured these scenarios, our specific test functions, and the files the scenarios use, see Appendix B.

## Test results and analysis

In this section we examine the results of each of our tests. Figure 2 shows the times, in seconds, that each test system needed to complete each scenario. The times we show for each platform for each scenario are from the median run of the five test runs of that scenario on that platform. (We defined the median run as the one with the median sum of the times of its timed tasks.)

| Tests | AMD Athlon 64 X2 5200+ processor on ASUS M2NBP-VM CSM | Intel vPro with Core 2 Duo processor E6700 on Intel DQ965GF |
|---|---|---|
| **Communications and collaboration** | | |
| Opening a compressed Outlook XML file attachment (FG) | 15.41 | 13.56 |
| Microsoft Groove 2007 sync (BG) | 50.39 | 22.79 |
| **Intuit QuickBooks scenario** | | |
| Viewing a set of reports in Intuit QuickBooks Pro 2006 | 5.20 | 4.15 |
| **Excel recalculation scenario** | | |
| Recalculating business revenue using Microsoft Excel | 45.41 | 28.55 |
| **Monte Carlo simulation** | | |
| Running a Monte Carlo simulation in Microsoft Excel 2007 | 5.83 | 4.63 |
| **Dual-monitor Windows Vista Aero scenario** | | |
| View a slideshow while a video plays (tester analysis) | choppy | smooth |
| Play an HD video (tester analysis) | poor | smooth |

**Figure 2: Median test times, in seconds, for both test systems on all five scenarios. Lower numbers are better.**

We explain the dual-monitor scenario's results in the Test results section on the dual-monitor scenario. Basically, the Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700 had no problems during the slideshow transitions or with the HD video playback, while the AMD Athlon 64 X2 5200+ processor-based PC paused between all slide transitions and had poor HD video playback, with significant video glitches covering approximately 40 percent of the screen during the playback.

In the following sub-sections we explore these results in more detail. To make comparisons easier, we always show results normalized to those of the slower system, the AMD Athlon 64 X2 5200+ processor-based PC. To compute those normalized results, we divided the other system's time by the time it took the slower system. The result for the AMD Athlon 64 X2 5200+ processor-based PC is thus always 1.00, because it's the comparison basis. Results higher than 1.00 indicate how much faster the Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700 is than that system. Because of the normalization, higher result numbers are better. For example, a result of 1.80 would mean the Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700 was 80 percent faster than the AMD Athlon 64 X2 5200+ processor-based PC.

## Communications and collaboration scenario: Opening a compressed Outlook message attachment, an XML file, in Microsoft Word 2007 while a Microsoft Groove workspace synchronization runs

As Figures 3 and 4 show, the Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700 was 1.14 times faster than the AMD Athlon 64 X2 5200+ processor-based PC on the foreground task and 2.21 times faster on the background task.

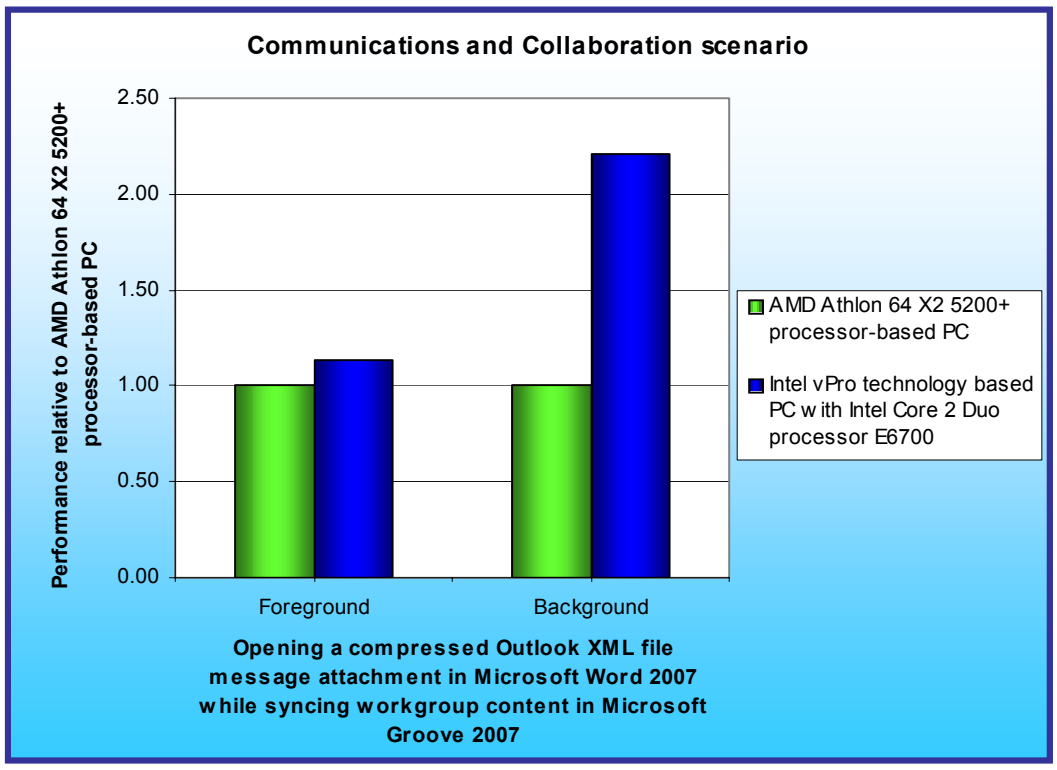

Communications and Collaboration scenario
Performance relative to AMD Athlon 64 X2 5200+ processor-based PC
2.50
2.00
1.50
1.00
0.50
0.00
Foreground
Background
AMD Athlon 64 X2 5200+ processor-based PC
Intel vPro technology based PC with Intel Core 2 Duo processor E6700
Opening a compressed Outlook XML file message attachment in Microsoft Word 2007 while syncing workgroup content in Microsoft Groove 2007

**Figure 3: Normalized results for the Communications and collaboration scenario for both test systems. Larger numbers indicate better performance.**

As Figure 4 shows, these differences represent significant improvements in the time it takes to perform each task. Compared to the Intel AMD Athlon 64 X2 5200+ processor-based PC, the Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700 decreased the elapsed time from 15.41 to 13.56 seconds on the foreground task and from 50.39 to 22.79 seconds on the Microsoft Groove sync task. That sync is important because until it finishes the user cannot join and work in the Groove workspace.

| PERFORMANCE RESULTS (seconds) | | TASKS | COMPARATIVE RATING | |
|---|---|---|---|---|
| AMD Athlon 64 X2 5200+ processor on ASUS M2NBP-VM CSM | Intel vPro with Core 2 Duo processor E6700 on Intel DQ965GF | | AMD Athlon 64 X2 5200+ processor on ASUS M2NBP-VM CSM | Intel vPro with Core 2 Duo processor E6700 on Intel DQ965GF |
| 15.41 | 13.56 | Foreground: Opening a compressed Outlook XML file attachment | 1.00 | 1.14 |
| 50.39 | 22.79 | Background: Microsoft Groove 2007 sync | 1.00 | 2.21 |

**Figure 4: Results for the Communications and collaboration scenario for both test systems. Lower performance results are better. Higher comparative ratings are better.**

## Viewing data in Intuit QuickBooks Pro 2006

As Figures 5 and 6 show, the Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700 was 1.25 times faster than the AMD Athlon 64 X2 5200+ processor-based PC on this test.

Figure 6 shows that this difference meant that the Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700 finished the task more than a second faster than the AMD Athlon 64 X2 5200+ processor-based PC.

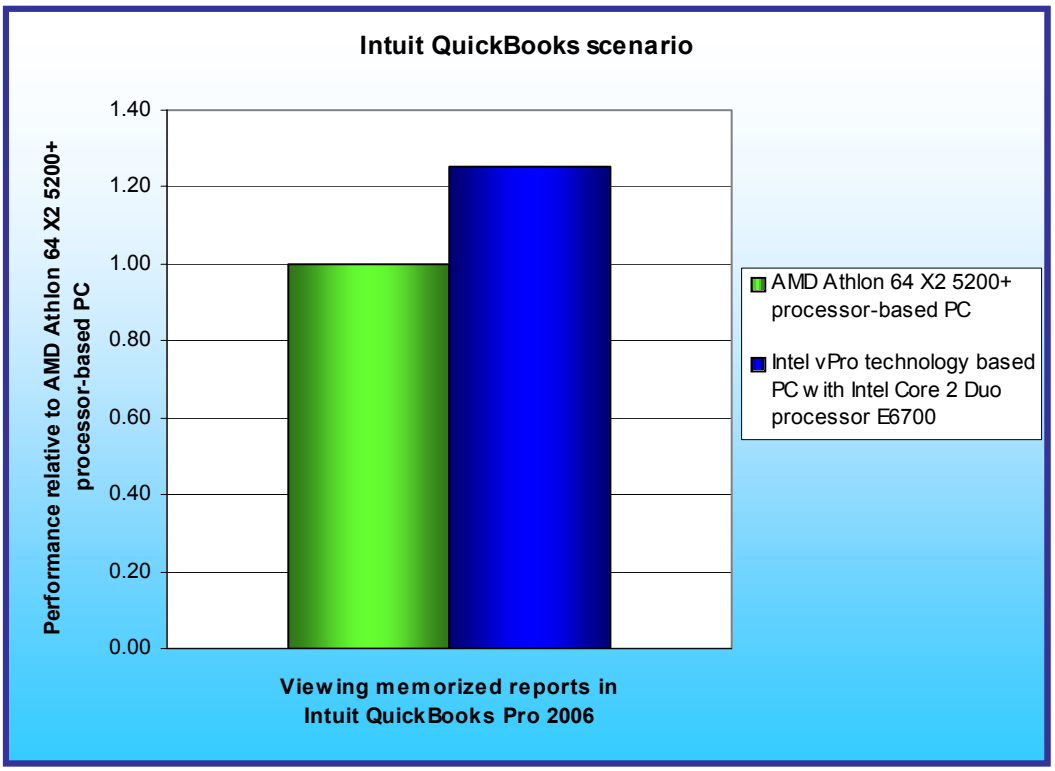


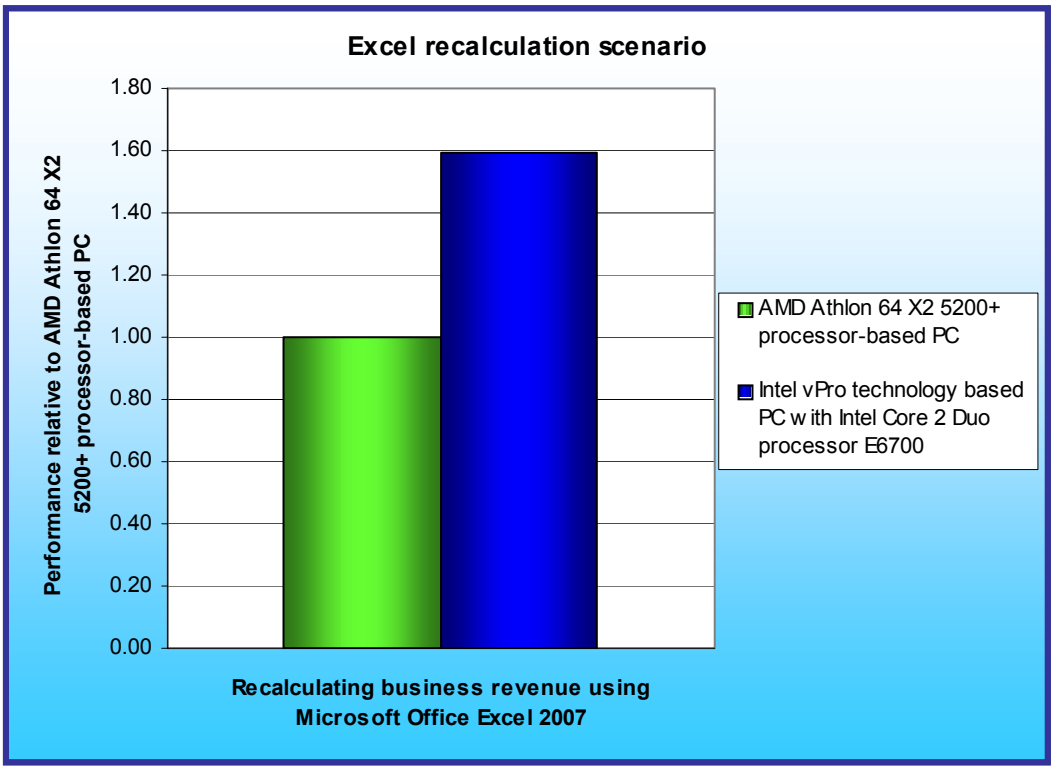

**Figure 5: Normalized results for the Intuit QuickBooks scenario for both test systems. Larger numbers indicate better performance.**

| PERFORMANCE RESULTS (seconds) | | TASKS | COMPARATIVE RATING | |
|---|---|---|---|---|
| AMD Athlon 64 X2 5200+ processor on ASUS M2NBP-VM CSM | Intel vPro with Core 2 Duo processor E6700 on Intel DQ965GF | | AMD Athlon 64 X2 5200+ processor on ASUS M2NBP-VM CSM | Intel vPro with Core 2 Duo processor E6700 on Intel DQ965GF |
| 5.20 | 4.15 | Task: Viewing memorized reports in QuickBooks | 1.00 | 1.25 |

**Figure 6: Results for the Intuit QuickBooks scenario for both test systems. Lower performance results are better. Higher comparative ratings are better.**

## Recalculating business revenue using Microsoft Office Excel 2007

As Figures 7 and 8 show, the Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700 was 1.59 times faster than the AMD Athlon 64 X2 5200+ processor-based PC on this test.




As Figure 8 shows, this difference represented a significant improvement in the time necessary to perform the task. The Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700 finished the task more than 16 seconds faster than the AMD Athlon 64 X2 5200+ processor-based PC.

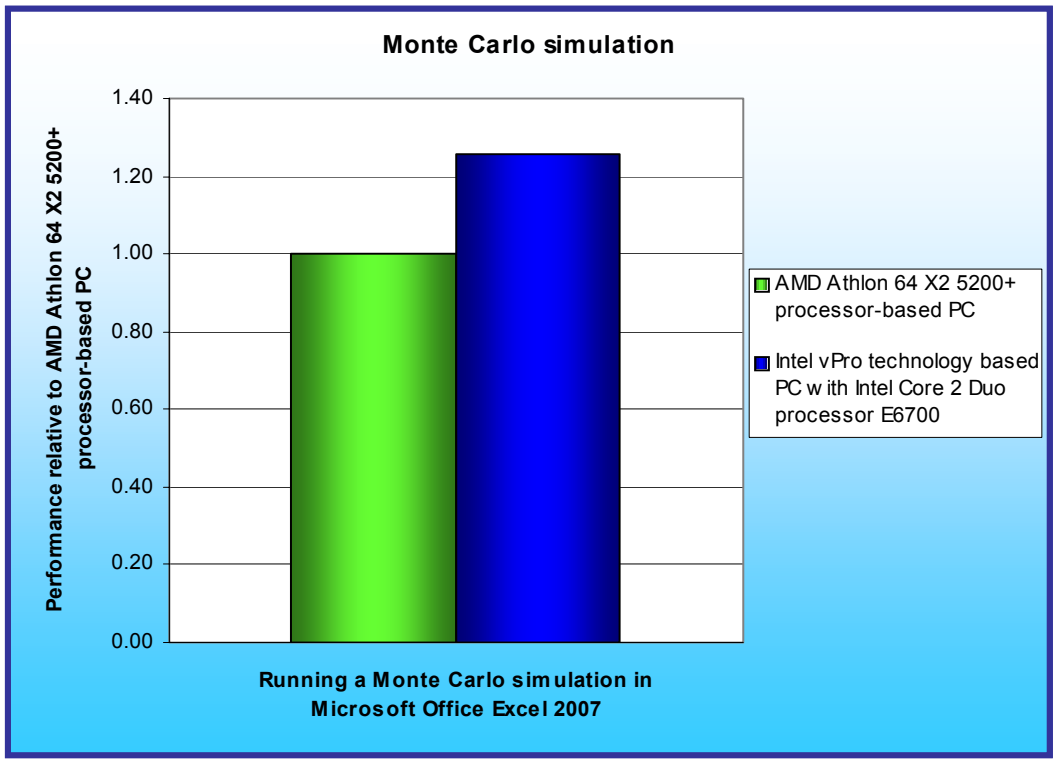
**Figure 7: Normalized results for the Excel recalculation scenario for both test systems. Larger numbers indicate better performance.**

| PERFORMANCE RESULTS (seconds) | | TASKS | COMPARATIVE RATING | |
|---|---|---|---|---|
| AMD Athlon 64 X2 5200+ processor on ASUS M2NBP-VM CSM | Intel vPro with Core 2 Duo processor E6700 on Intel DQ965GF | | AMD Athlon 64 X2 5200+ processor on ASUS M2NBP-VM CSM | Intel vPro with Core 2 Duo processor E6700 on Intel DQ965GF |
| 45.41 | 28.55 | Task: Recalculating business revenue | 1.00 | 1.59 |

**Figure 8: Results for the Excel recalculation scenario for both test systems. Lower performance results are better. Higher comparative ratings are better.**

## Running a Monte Carlo simulation in Microsoft Office Excel 2007

Figures 9 and 10 illustrate the results of this test. The Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700 was 1.26 times faster than the AMD Athlon 64 X2 5200+ processor-based PC.




As Figure 10 shows, this difference meant that the Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700 returned the answer over a second faster than the AMD Athlon 64 X2 5200+ processor-based PC.

**Figure 9: Normalized results for the Monte Carlo simulation for both test systems. Larger numbers indicate better performance.**

| PERFORMANCE RESULTS (seconds) | | TASKS | COMPARATIVE RATING | |
|---|---|---|---|---|
| AMD Athlon 64 X2 5200+ processor on ASUS M2NBP-VM CSM | Intel vPro with Core 2 Duo processor E6700 on Intel DQ965GF | | AMD Athlon 64 X2 5200+ processor on ASUS M2NBP-VM CSM | Intel vPro with Core 2 Duo processor E6700 on Intel DQ965GF |
| 5.83 | 4.63 | Task: Running a Monte Carlo simulation | 1.00 | 1.26 |

**Figure 10: Results for the Monte Carlo simulation for both test systems. Lower performance results are better. Higher comparative ratings are better.**

## Dual-monitor Windows Vista Aero scenario: Viewing a slideshow while a video plays

This scenario utilizes two monitors to view a slideshow of 50 digital photographs on one monitor and play an HD video on the other. The results we present indicate whether the slideshow transitions were smooth or choppy and whether each system had any problem playing the HD video. This test illustrates the ability of the Intel vPro technology-based PC to deliver a smoother user dual-monitor experience.

As Figure 11 shows, the Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700 was able to handle the slide transitions smoothly and play the HD video with no problems. By contrast, on the AMD Athlon 64 X2 5200+ processor-based PC the transitions between all of the 50 slides were not fluid. Instead, the slides paused for a fraction of a second between each transition. The quality was clearly worse than that of the Intel vPro technology-based PC with the Intel Core 2 Duo processor E6700.

In addition, the HD video playback also exhibited noticeable glitches on the AMD Athlon 64 X2 5200+ processor-based PC. Through most of the playback, video glitches, such as small rectangles of single colors, covered approximately 40 percent of the screen. Few users would be willing to tolerate these video glitches for more than a few seconds.

These differences represent significant improvements in how a user would experience the Windows Vista user interface in the increasingly common dual-monitor setup.

| TASKS | PERFORMANCE RESULTS (subjective) | |
|---|---|---|
| | **AMD Athlon 64 X2 5200+ processor on ASUS M2NBP-VM CSM** | **Intel vPro with Core 2 Duo processor E6700 on Intel DQ965GF** |
| Task: Viewing a slideshow | Choppy - The system paused between each slide transition. | Smooth (no problems) |
| Task: Playing a video | Poor video quality - Obvious video errors covered approximately 40 percent of the screen during most of the test. | Smooth (no problems) |

**Figure 11: Results for the Dual-monitor Vista Aero scenario for both test systems. The results reflect the assessments of the testers.**

# Test methodology

## Setting up the test systems

To get the most accurate and repeatable results possible, start with a clean hard disk and set up all the test systems using the following procedures.

### Installing Microsoft Windows Vista Ultimate

Use the following process to install a clean version of Windows Vista Ultimate on each system under test:

1. Install Windows Vista Ultimate Build 6000.
   a. Boot to a Windows Vista Ultimate Build 6000 DVD.
   b. When prompted, press any key to boot from CD or DVD.
   c. At the language and preference screen, accept the default options, and click Next.
   d. Click Install now.
   e. Do not enter a Product key. Uncheck Automatically activate Windows when I'm online, and click Next.
   f. At the Do you want to enter your product key now screen, click No.
   g. Select Windows Vista Ultimate, and check I have selected the edition of Windows that I purchased.
   h. Click Next.
   i. Check I accept the license terms.
   j. Click Next.
   k. At the Which type of installation do you want screen, select Custom (advanced).
   l. Click Drive options (advanced).
   m. Select the destination Disk for the operating system.
   n. Click Format.
   o. Click OK at the all data stored will be permanently deleted dialog.
   p. Once the system finishes formatting the disk, click Next.
   q. Fill in the Username and Password fields, and click Next.
   r. Fill in the computer name field, and click Next.
   s. When presented with the option to enable Automatic Updates, click Ask me later.
   t. Select the correct time zone, date, and time, and click Next.
   u. At the Select your computer's current location screen, click Public location.
   v. Click Start at the Thank you screen.
   w. When the Windows Vista Ultimate installation completes, close the Welcome Center Dialog.
   x. At the Set network location screen, click Public location.
   y. Click Close.
2. Set the test resolution.
   a. Right-click on the desktop.
   b. Select Personalize.
   c. Click Display Settings.
   d. If the monitor resolution is not already 1280 by 1024, adjust it to that setting.
   e. Click OK.
3. Verify that Windows Automatic Updates are off.
   a. Click Start.
   b. Select Control Panel.
   c. Click Security.
   d. Under Security Center, select Turn automatic updating off.
   e. Select the Never check for updates radio button.
   f. Click OK.
4. Turn off System Restore. Doing so prevents such events from occurring during testing and affecting results.
   a. Click Start.
   b. Right-click Computer.
   c. Select Properties.
   d. Select System protection on the left.
   e. Click Continue.

f. Uncheck each box under Automatic restore points.
g. Select Turn System Restore Off at the System Protection pop-up window.
h. Click OK.

5. Add the system to the test domain.
   a. Click Start.
   b. Right-click Computer
   c. Select Properties.
   d. Select Change settings.
   e. Click Continue.
   f. Click Change.
   g. Select the Domain radio button.
   h. Type the test domain name.
   i. Click OK.
   j. Type the administrator credentials in the User name and Password fields.
   k. Click OK.
   l. Click OK at the Computer Name/Domain Changes dialog box.
   m. Click OK again.
   n. Close the System Properties window.
   o. Close all other open windows before clicking Restart Now.
   p. Log in.
   q. Uncheck the Run at startup box on the Welcome Center before closing it.
6. Add the user to the Administrators group.
   a. Click Start.
   b. Right-click Computer.
   c. Select Manage.
   d. Click Continue.
   e. Select Local Users and Groups on the left.
   f. Double-click Groups in the center.
   g. Select Administrators.
   h. Click Add…, and type the domain test user account.
   i. Click OK.
   j. Type the administrator credentials in the User name and Password fields.
   k. Click Apply.
   l. Click OK.
   m. Close all windows.
   n. Click Start.
   o. Click the arrow→.
   p. Select Log Off.
   q. Press Ctrl + Alt + Delete at the prompt.
   r. Click Switch User, and select Other User.
   s. Type the test user's credential in the User name and Password fields.
   t. Press Enter.
7. Turn all Power Management settings to Performance.
   a. Click Start.
   b. Select Control Panel.
   c. Select Appearance and Personalization.
   d. Under Personalization, click Change screen saver.
   e. Select (None) from the Screen saver drop-down menu.
   f. Click the Change power settings link.
   g. Click the High performance radio button.
   h. Select Never for the Turn off the display and Put the computer to sleep drop-down menus.
   i. Click Change advanced power settings.
   j. Click Hard disk→Turn off hard disk after→Setting (Minutes), then type Never.
   k. Scroll down, and click Sleep→Sleep after→Setting (Minutes), and type Never.
   l. Click Sleep→Allow Hybrid Sleep→Setting.

m. Select Off.
n. Scroll down, and click Display→Turn off display after→Setting, then type Never.
o. Click OK.
p. Click Save changes.
q. Close the Power Options window.
r. Click OK on the Screen Saver Settings.

### Installing Adobe Acrobat Reader 7.0.8

Use the following process to install a clean version of Adobe Acrobat Reader 7.0.8:

1. Download Adobe Acrobat Reader 7.0.8 from: http://www.adobe.com/products/acrobat/readstep2.html.
2. Install Adobe Acrobat Reader 7.0.8 with default settings.
   a. Double-click the Adobe Acrobat Reader executable.
   b. Click Run at the Security Warning screen.
   c. Click Continue.
   d. Click Next at the Setup screen.
   e. Click Next at the Welcome screen.
   f. Accept the default installation path, and click Next.
   g. Click Install.
   h. Click Finish.

### Installing Adobe Flash Player 9.0

Use the following process to install a clean version of Adobe Flash Player 9:

1. Install Adobe Flash Player 9 from http://www.adobe.com/shockwave/download/download.cgi?P1_Prod_Version=ShockwaveFlash&promoid=BIOW.
   a. Uncheck the box next to YAHOO! toolbar, and click Install Now.
   b. Click Continue at the User Account Control dialog.
   c. Click Install at the Security Warning dialog.
   d. Flash Player is successfully installed when the flash installation completion movie plays.

### Installing Intuit QuickBooks Pro 2006

Use the following process to install a clean version of Intuit QuickBooks Pro 2006. This installation includes an automatic installation of the Microsoft .NET 1.1 Runtime.

Note: We occasionally received the following message near the end of the Intuit QuickBooks installation process: “Error 1904.Module C:\QB.ocx failed to register”. We clicked Ignore to bypass this error.

1. Insert the Intuit QuickBooks Pro 2006 installation CD.
   a. Click Run setup.exe.
   b. Click Allow at the User Account Control screen.
   c. Click Run program at the Program Compatibility Assistant screen.
   d. Click Install at the welcome screen.
   e. Click Next at the .NET 1.1 Runtime installation screen.
   f. Click Next at the Welcome to QuickBooks Installation Wizard screen.
   g. Select Accept, and click Next at the License Agreement screen.
   h. Enter the Intuit QuickBooks License Number and Product Number, and click Next.
   i. Accept the default installation path, and click Next.
   j. Click Install at the Ready to install QuickBooks screen.
   k. Click Finish at the installation complete screen.
   l. Click OK at the QuickBooks has completed verifying configuration dialog.
2. After installation of Intuit QuickBooks Pro 2006 completes, configure the application for testing by following these steps once:
   a. Launch the application by double-clicking the QuickBooks Pro 2006 desktop shortcut.
   b. Click File→Open Company.

c. Select sample_product based_business.qbw, and click Open.
d. Click OK at the QuickBooks Information dialog.

3. At the QuickBooks Learning Center screen, uncheck Show this window at startup, and close the Welcome screen.
4. Turn off automatic updates by following these steps once:
   a. Click Help→Update QuickBooks→Options.
   b. Select No to Automatic Update.
   c. Click Save.
   d. Close the Update dialog.
5. Close all open windows.
6. Close QuickBooks.
7. Launch Intuit QuickBooks Pro 2006.
8. Verify that a single window with the title No Company Open appears.
9. Close QuickBooks.

## Setting up the test network

To mimic the environment in which business PCs run, we set up a test network with servers handling Microsoft Exchange, Microsoft Active Directory, Microsoft Office Groove Manager, and Microsoft Groove Relay. Figure 12 shows a basic diagram of this test network.

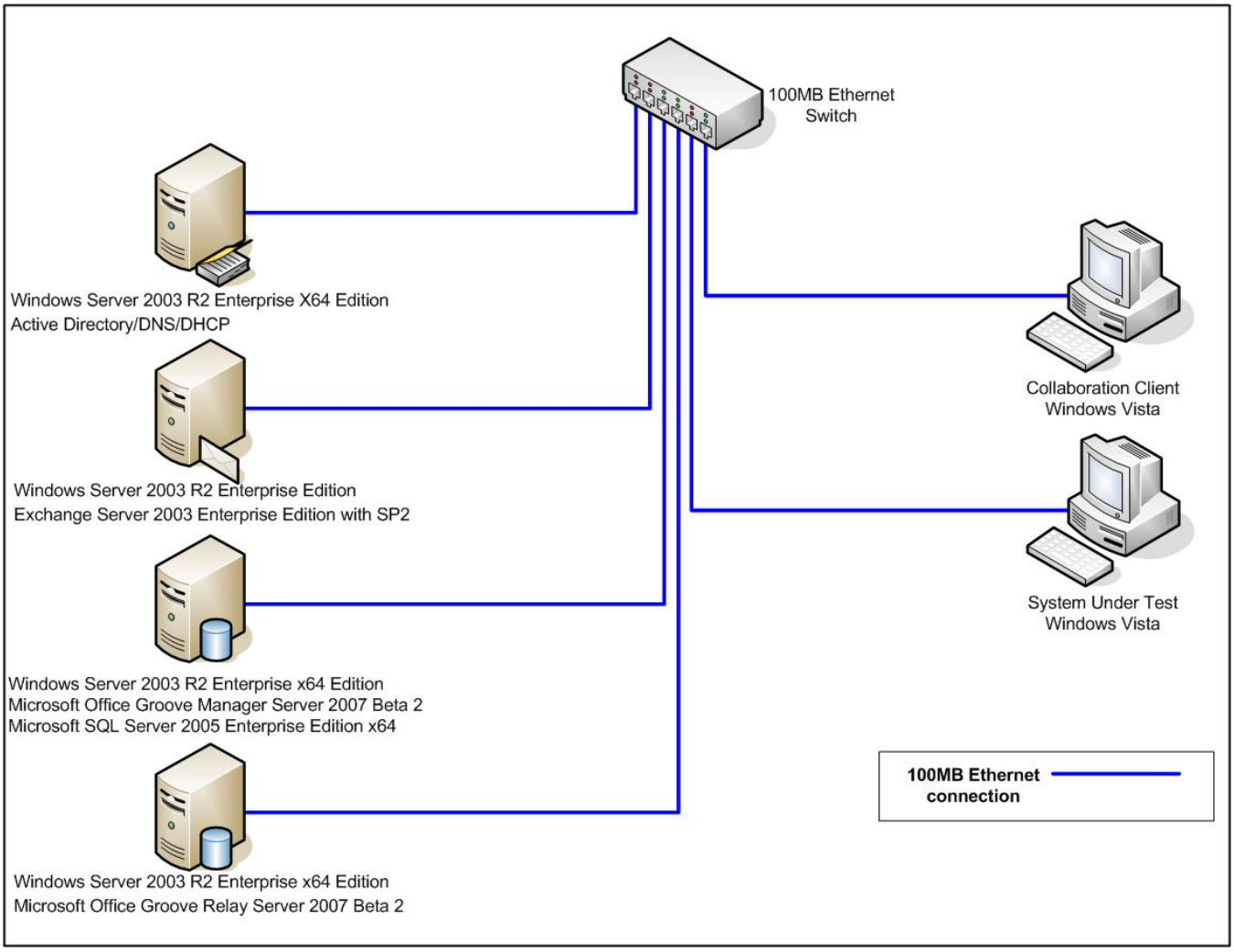

100MB Ethernet Switch
Windows Server 2003 R2 Enterprise X64 Edition
Active Directory/DNS/DHCP
Collaboration Client
Windows Vista
Windows Server 2003 R2 Enterprise Edition
Exchange Server 2003 Enterprise Edition with SP2
System Under Test
Windows Vista
Windows Server 2003 R2 Enterprise x64 Edition
Microsoft Office Groove Manager Server 2007 Beta 2
Microsoft SQL Server 2005 Enterprise Edition x64
100MB Ethernet connection
Windows Server 2003 R2 Enterprise x64 Edition
Microsoft Office Groove Relay Server 2007 Beta 2

**Figure 12: Diagram of the test network.**

Appendix A provides configuration details for both the systems we tested and the other systems in this test network.

The follow subsections outline how to set up the servers in this network.

## Setting up the Active Directory/DNS/DHCP server

1. Install Windows Server 2003 R2, Enterprise x64 Edition on the server.
   a. Insert and boot from the HP SmartStart 7.60 CD.
   b. Select English (the default), and click Continue.
   c. At the SmartStart Home screen, click Deploy Server.
   d. At the Server Deployment – Hardware Configuration screen, click Continue.
   e. At the Server Deployment – Operating System Selection screen, expand Microsoft Windows 2003 and select Microsoft Windows Server 2003 R2, Enterprise x64 Edition. Click Continue.
   f. At the Server Deployment – Operating System Media Source screen, select CD-ROM as the source type and Flat files as the source format. Click Continue.
   g. At the Server Deployment – Disk Partitioning Options screen, click Continue.
   h. At the Server Deployment – Operating System Configuration Information screen, enter the User Name, Organization Name, and Product Key.
   i. Set License Type to Per Seat (the default), and click Continue.
   j. At the Server Deployment – SNMP Configuration screen, click Continue.
   k. At the Server Deployment – Ready to Install screen, click Continue. Setup will begin.
   l. The setup program will prompt you at the Server Deployment screen to Please insert the operating system media and click Continue. Insert the Microsoft Windows Server 2003 R2 Enterprise Edition CD Disc 1 into the CD-ROM drive, and click Continue. Setup will verify the media and begin copying data files. Once setup finishes copying the files it needs your system will automatically reboot.
2. Set the Administrator account password to Password1, the server name to SERVER1-AD, and the Workgroup to ACME.
3. Disable the second network card by right-clicking the taskbar icon and selecting disable.
4. Set the server name and give this server a unique static IP address. (The IP addresses in these instructions are simply samples; your IP addresses will depend on your domain.)
   - Name: SERVER1-AD
   - IP Address: 192.168.0.1
   - Subnet mask: 255.255.255.0
   - Default gateway: 192.168.0.254
   - DNS: 192.168.0.1
   - Workgroup: ACME
5. Install the latest security updates from the Windows Update site.
6. Set up Active Directory.
   a. From Manage Your Server, click Add or remove a role.
   b. Click Next.
   c. If you have 1 or more network connections that are disconnected, you will receive a warning message stating that fact. Cick Continue if this message appears.
   d. From the Configuration Options screen, select Typical configuration for a first server, and click Next.
   e. The Active Directory domain name will default to ACME.local; accept this name, and click Next.
   f. The NetBIOS domain name will default to ACME; accept this name, and click Next.
   g. At the summary, click Next.
   h. Click OK when the restart message screen appears.
   i. Insert the Windows 2003 Disc 1 CD when the system prompts you to do so. Your server reboot automatically during this setup process.
   j. Once it reboots, login and click Next when the Configure Your Server Wizard appears.
   k. Click Finish. Installation is now complete.
7. Configure Active Directory setup by changing the domain mode from Windows 2000 mixed to Windows Server 2003.
   a. Open Start→Administrative Tools→Active Directory Users and Computers.
   b. Right-click the ACME.local domain from the list.
   c. Select Raise Domain Functional Level.
   d. In the drop-down menu, select Windows Server 2003, and click Raise.
   e. Click OK when the warning screen appears.

8. Set up the router address in DHCP.
   a. Open Start→Administrative Tools→DHCP.
   b. Expand the domain.
   c. Right-click Server Options, and select Configure Options.
   d. From the General tab, select the 003 Router option, and make sure it is checked.
   e. In the Data entry frame, in the IP address: field, enter the IP address of the router (192.168.0.254).
   f. Click Add.
   g. Click OK.

## Setting up the Exchange server

1. Install Windows Server 2003 R2 Enterprise Edition on the server.
   a. Insert and boot from the HP SmartStart 7.60 CD.
   b. Select English (the default), and click Continue.
   c. At the SmartStart Home screen, click Deploy Server.
   d. At the Server Deployment – Hardware Configuration screen, click Continue.
   e. At the Server Deployment – Operating System Selection screen, expand Microsoft Windows 2003 and select Microsoft Windows Server 2003 R2, Enterprise Edition. Click Continue.
   f. At the Server Deployment – Operating System Media Source screen, select CD-ROM as the source type and Flat files as the source format. Click Continue.
   g. At the Server Deployment – Disk Partitioning Options screen, click Continue.
   h. At the Server Deployment – Operating System Configuration Information screen, enter the User Name, Organization Name, and Product Key.
   i. Set License Type to Per Seat (the default), and click Continue.
   j. At the Server Deployment – SNMP Configuration screen, click Continue.
   k. At the Server Deployment – Ready to Install screen, click Continue. Setup will begin.
   l. The setup program will prompt you at the Server Deployment screen to Please insert the operating system media and click Continue. Insert the Microsoft Windows Server 2003 R2 Enterprise Edition CD Disc 1 into the CD-ROM drive, and click Continue. Setup will verify the media and begin copying data files. Once setup finishes copying the files it needs your system will automatically reboot.
2. Set the Administrator account password to Password1, the server name to SERVER2-EX, and the Workgroup to ACME.
3. Disable the second network card by right-clicking the taskbar icon and selecting disable.
4. Set the server name and give this server a unique static IP address. (The IP addresses in these instructions are simply samples; your IP addresses will depend on your domain.)
   - Name: SERVER2-EX
   - IP Address: 192.168.0.2
   - Subnet mask: 255.255.255.0
   - Default gateway: 192.168.0.254
   - DNS: 192.168.0.1
   - Workgroup: ACME
5. Install the latest security updates from the Windows Update site.
6. Add SERVER2-EX to the ACME domain.
   a. Go to Control Panel→System.
   b. On the Computer Name tab, click Change.
   c. Select Domain, and enter ACME.local as the domain. Click OK.
   d. When prompted, enter the username Administrator and the password Password1, then click OK.
   e. Click OK.
   f. Click OK.
   g. Click OK.
   h. Click Yes to restart.
   i. After restart, press Ctrl-Alt-Delete at the login screen and click Options.
   j. Select the ACME domain, and login as Administrator.
7. Set up Microsoft Internet Information Services (IIS) 6.0. (You must set up IIS on the server before you install Microsoft Exchange Server 2003.)

a. To install IIS 6.0 on Windows 2003 Enterprise or Standard Edition, use Add or Remove Programs in the Windows Control Panel.
b. Choose Add/Remove Windows Components.
c. Select the Internet Information Services (IIS) component

8. Installing Exchange Server 2003 Enterprise Edition.
   a. Insert the Exchange Server 2003 Enterprise Edition CD.
   b. Click Exchange Deployment Tools.
   c. Accept all default settings, and finish with the install.
9. Install Exchange Server 2003 SP2 with the default installation options.
10. Set up the user accounts. (The scenario tests require one user account for each system under test, plus an account for the collaboration scenario client.) To do this, run Active Directory Users and Computers from the Administrative Tools menu, and add the user accounts. Active Directory and Exchange will automatically assign each user an Exchange email address.

## Setting up the server for Groove Manager/SQL server

1. Install Windows Server 2003 R2 Enterprise x64 Edition on the server.
   a. Insert and boot from the HP SmartStart 7.60 CD.
   b. Select English (the default), click Continue.
   c. At the SmartStart Home screen, click Deploy Server.
   d. At the Server Deployment – Hardware Configuration screen, click Continue.
   e. At the Server Deployment – Operating System Selection screen, expand Microsoft Windows 2003 and Select Microsoft Windows Server 2003 R2, Enterprise x64 Edition. Click Continue.
   f. At the Server Deployment – Operating System Media Source screen, select CD-ROM as the source type and Flat files as the source format. Click Continue.
   g. At the Server Deployment – Disk Partitioning Options screen, click Continue.
   h. At the Server Deployment – Operating System Configuration Information screen, enter the User Name, Organization Name, and Product Key.
   i. Set License Type to Per Seat (the default). Click Continue.
   j. At the Server Deployment – SNMP Configuration screen, click Continue.
   k. At the Server Deployment – Ready to Install screen, click Continue. Setup will begin.
   l. The setup program will prompt you at the Server Deployment screen to Please insert the operating system media and click Continue. Insert the Microsoft Windows Server 2003 R2 Enterprise Edition CD Disc 1 into the CD-ROM drive, and click Continue. Setup will verify the media and begin copying data files. Once setup finishes copying the files it needs your system will automatically reboot.
2. Set the Administrator account password to Password1, the server name to SERVER3-GS, and the Workgroup to ACME.
3. Disable the second network card by right-clicking the taskbar icon and selecting disable.
4. Set the server name and give this server a unique static IP address. (The IP addresses in these instructions are simply samples; your IP addresses will depend on your domain.)
   - Name: SERVER3-GS
   - IP Address: 192.168.0.3
   - Subnet mask: 255.255.255.0
   - Default gateway: 192.168.0.254
   - DNS: 192.168.0.1
5. Install the latest security updates from the Windows Update site.
6. Add SERVER3-GS to the ACME domain.
   a. Go to Control Panel→System.
   b. On the Computer Name tab, click Change.
   c. Select Domain, and enter ACME.local as the domain. Click OK.
   d. When prompted, enter the username Administrator and the password Password1, then Click OK.
   e. Click OK.
   f. Click OK.
   g. Click OK.
   h. Click Yes to restart.
   i. After restart, press Ctrl + Alt + Delete at the login screen, and click Options.

j. Select the ACME domain, and login as Administrator.

7. Set up Microsoft IIS 6.0.
   a. To install IIS 6.0 on Windows 2003 Enterprise or Standard Edition, use Add or Remove Programs in the Windows Control Panel.
   b. Choose Add/Remove Windows Components.
   c. Select the Internet Information Services component.
   d. From IIS, enable SMTP and configure it so that administrators can send email containing account configuration codes to Groove users.
8. Install Microsoft SQL Server 2005 Enterprise Edition x64.
   a. Insert the Microsoft SQL Server 2005 Enterprise Edition x64 CD-ROM drive. The installation wizard will automatically appear.
   b. At the Feature Selection Setup Screen, select Database Services, Integration Services, and Client Components.
   c. For Instance Name, select the Default, and click Next.
   d. At Service Account, select Use the built-in System account, chose Local system, and click Next.
   e. At the Authentication Mode, select Mixed Authentication Mode, and click Next.
   f. For the Collation Settings screen, keep all the default settings, and click Next.
   g. For Error and Usage Report Settings screen, leave both check boxes unchecked, and click Next.
   h. At the Ready to Install screen, click Install.
   i. When the Installation Complete screen appears, click Finish.
9. Run Windows Update again and install any new security updates.
10. Install and configure the Microsoft Groove Manager.
    a. Insert the Microsoft Office Groove Server Beta 2 CD into the drive.
    b. Select the option to install Microsoft Office Groove Server 2007 Groove Manager.
    c. Follow the Setup instructions and enter the product ID key code when the installation software prompts you to do so.
    d. Accept the Microsoft license agreement.
    e. Once the Office components and settings are installed, select the Basic installation option.
    f. When the Groove Manager Configuration wizard starts, enter the following Groove Manager configuration information:

| | |
|---|---|
| Administrator E-mail Address | jcarlson@ACME.local |
| Organization Name | ACME |
| URL of Groove Manager Server | http://server3-gs.acme.local |
| Certification Authority Name | server3-gs.acme.local |
| Configure Groove Audit Server Components | Do not select this option |

    g. Click Next.
    h. When the system prompts you to do so, enter the following SQL Server information. (The Groove Manager uses this information to establish a connection to the database server on which the Groove Manager depends for data storage. Give the account administrative permissions on the database.)

| | |
|---|---|
| Use the Following SQL Server Login | Select this checkbox. |
| User Name | Administrator |
| Password | Password1 |
| SQL Server Name | server3-gs.acme.local |
| Database Name | Accept the default name (gmsDb) |

    i. Click Next.
    j. Follow the Install wizard to the end, accepting defaults, and click Finish.
11. To access the Groove Manager administrative Web interface, follow these steps:
    a. Open an Internet Explorer browser.
    b. Enter the URL for the Groove Manager site (http://server3-gs).
    c. Log in with the username Administrator and the password Password1.
    d. Select Members from the navigation pane.

e. Click Add Members in the toolbar. A list of user deployment options appears.
f. Click Add Single Member, then click Next. The Select Member Settings page appears.
g. From the Select Member Settings page, accept the default policy templates and relay server sets.
h. Click Next. The Add Single Member page appears.
i. From the Add Single Member page, type the user data into the fields to create the following two identities the test scenarios require. This data will appear in the user's Groove Contact Properties.
    i. Full name - Jenny Carlson
    ii. Email address - jcarlson@acme.local
j. Click the Save and Create Another button to repeat the above process for the next user.
    i. Full name - Sheila Craig
    ii. Email address scraig@acme.local
k. When you finish adding member information, click the Finish button.

12. Send a Groove account configuration code with its associated identity information to Groove users from a Groove Manager email message.
    a. From the Members page, select target recipients for the email.
    b. Click the top check box to select all users.
    c. Select the Manage Members drop-down menu in the toolbar.
    d. Click Send Groove Account Configuration Code. The Send Groove Account Configuration Code window appears with an email form that shows any default email.
    e. Enter the following information in the fields on the default email page:
        i. Select Sample account configuration email to display the initial default account restoration email.
        ii. Enter administrator@acme.local as the email address.
        iii. Enter Groove for the email subject.
        iv. Click the Send button. This sends the email, along with the Account configuration code for the individual Groove accounts.

## Setting up the Groove Relay server

1. Install Windows Server 2003 R2 Enterprise x64 Edition on the server.
    a. Insert the Windows Server 2003 R2 Enterprise x64 Edition CD.
    b. When a screen appears prompting you to press any key to boot from the CD, press any key.
    c. Press Enter at the Welcome to Setup screen to setup Windows Server 2003.
    d. Press F8 at the Windows License Agreement screen.
    e. If a previous version of Windows Server was installed on the drive, the installation software will ask if you would like to repair the damaged installation. Press Esc to continue installing a fresh copy of Windows without repairing.
    f. At the Windows Server 2003 Setup screen, delete any existing C: partitions by selecting the partition to delete and pressing the D key.
    g. Hit Enter to confirm the deletion.
    h. Press L to confirm the deletion.
    i. You will return to the Windows Server 2003 Setup screen. Select the Unpartitioned Space, and press Enter.
    j. Using the arrow keys, select Format the partition using the NTFS file system (Quick), and press Enter.
    k. Once the formatting and the file copy complete, the installation software will prompt you to restart the system. Press Enter to restart.
    l. A Windows Server 2003 loading screen and then a Windows installation screen will appear.
    m. Click Next at the Regional and Language Options screen.
    n. At the Personalize Your Software screen, enter Server as the name, leave the organization field blank, and click Next.
    o. At the Your Product Key screen, type the product key. and click Next.
    p. Leave the default settings at the Licensing Modes screen, and click Next.
    q. For computer name, type Server5-GR, and for administrator's password, type Password1. Type Password1 to again confirm. Click Next.

r. At the Date and Time Settings screen, select the current date and time and the (GMT -05:00) Eastern Time (US and Canada) time zone. Leave the Automatically adjust clock for daylight savings changes checked, and click Next.
s. Windows Server 2003 will automatically complete the installation process and restart the server.
t. Press Ctrl + Alt + Delete after the system restarts.
u. Log on to windows using the password you selected earlier.
v. At the Windows Setup Screen, the installation software will ask you to insert the Windows Server 2003 CD 2. Insert the CD, and click OK.
w. At the Windows Server 2003 R2 Setup Wizard Welcome Screen, click Next.
x. At the Windows Server 2003 R2 Setup Wizard Setup Summary, click Next.
y. The installer will copy more files to the server. When the Windows Server 2003 R2 Setup Wizard Completing Windows Server Setup screen appears, click Finish.
z. At the Windows Server Post-Setup Security Updates screen, click Finish.
aa. At the Windows Server Post-Setup Security Updates WARNING pop-up, click Yes to close the page.
bb. At the Manage Your Server screen, check the box next to Don't display this page at logon, and click the X in the top right corner to close the screen.

2. Set Administrator account password to Password1, the server name to SERVER5-GR, and the Workgroup to ACME.
3. Set the server name and give this server a unique static IP address. (The IP addresses in these instructions are simply samples; your IP addresses will depend on your domain.)
   - Name: SERVER5-GR
   - IP Address: 192.168.0.5
   - Subnet mask: 255.255.255.0
   - Default gateway: leave blank
   - DNS: 192.168.0.1
4. Add SERVER5-GR to the ACME domain:
   a. Go to Control Panel→System.
   b. On the Computer Name tab, click Change.
   c. Select Domain, and enter ACME.local as the domain. Click OK.
   d. When prompted, enter the username Administrator and the password Password1. Click OK.
   e. Click OK.
   f. Click OK.
   g. Click OK.
   h. Click Yes to restart.
   i. After restart, press Ctrl + Alt + Delete at the login screen, and click Options.
   j. Select the ACME domain, and login as Administrator.
5. Configure the system performance options.
   a. Open the System control panel applet, and click the Advanced tab.
   b. Click the Performance Options button.
   c. In the Optimize performance for field, select Background services.
   d. Click the Change button to display the Virtual Memory options.
   e. Set the initial virtual memory to 8192MB and the maximum to 16384MB.
   f. Click OK.
6. Configure each external network connection on the server.
   a. Right-click My Network Places, then select Properties to open the Network Connections window.
   b. Right-click the network interface card that you want to edit, and select Properties.
   c. Disable the Client for Microsoft Networks component.
   d. Disable the File and Printer Sharing for Microsoft Networks component.
   e. If the Internet Protocol (TCP/IP) component is not already enabled, enable it.
   f. Disable NetBIOS over TCP/IP by selecting Internet Protocol (TCP/IP), pressing the Properties button, clicking the Advanced button to open the Advance TCP/IP Settings window, clicking the WINS tab, and then selecting the Disable NetBIOS over TCP/IP option.
   g. Click the DNS tab, and make any changes necessary to support your network configuration.
   h. Click the IP Settings tab, and make any necessary changes to support your network configuration.
   i. Click OK until you return to the Network and Dial-Up Connections window.

7. Install the latest security updates from the Windows update site.
8. Install Groove Relay server:
   a. From the Windows server machine, insert the Microsoft Office Groove Server 2007 Beta 2 CD into the drive.
   b. Select the option to install Microsoft Office Groove Server 2007 Groove Relay. (The installation instructions are in the GettingStarted.htm file in the \grs subdirectory of the installation media. The Groove Relay Administrators Guide and release notes are also in this directory).
   c. Start the setup program by double-clicking the Groove Relay Setup link in the Getting Started.htm file.
   d. Follow the Setup wizard instructions. Entering the product ID key code when the installation software prompts you to do so.
   e. If the Microsoft Installer must be updated, the update will occur at this point. If it occurs, you will have to reboot the server. After reboot, manually start the setup process and continue.
   f. Accept the Microsoft license agreement.
   g. When the installation of the Office components and settings completes, choose Advanced installation.
   h. Select the Programs component, then click the Change button to override the default installation directory.
   i. Click Next
   j. Click the Change buttons to edit the paths for the Database and log files. Set the database and log files to use the path F:\Groove Relay\Data.
   k. Click the Feedback tab, and select No thank you.
   l. Click Next 3 times.
   m. Click Install.
   n. Click Finish to install the Groove Relay. The installer now launches the Groove Relay Configuration control panel applet.
9. Identify the Groove Relay and Generating Groove Relay Key Files to enable the secure provisioning of managed Groove users to the Groove Relay.
   a. If the Groove Relay Configuration control panel applet is not already open, do the following:
      i. Open the Control Panel from the Start menu.
      ii. Double-click the Groove Relay Configuration control panel applet.
   b. From the Server tab, set the field values as in the following table:

| | |
|---|---|
| Relay Server Name | server5-gr.acme.local |
| Administrative User Name | Administrator |
| Administrative Realm | server5-gr@acme.local |
| Administrative Password | Password1 |
| Private Key File Name | Default: privkey.dat |
| Certificate File Name | Default: ServerCertificate.cer |
| Unattended Startup | Default: selected (enable unattended startup) |

   c. Enter the Administrative Password, and generate the Groove Relay private key and certificate files by clicking the Generate Files button.
   d. Click Next. (This button will not be available if you have not completed all the required fields.)
10. Configure the Groove Relay SOAP interface for communications between the Groove Relay and Groove Manager servers.
   a. From the Groove Relay Configuration control panel applet SOAP tab, enter the information in the fields as in the following table:

| | |
|---|---|
| Relay SOAP Interface Name | http://server5-gr.acme.local |
| Private Key File Name | Accept the default file name.<br><br>Default: ServerSOAPKeyStore.xml |
| Certificate File Name | Accept the default file name, then click the Generate Files button to create the private key and certificate files.<br><br>Default: ServerSOAPCertificate.cer |
| Export ID | Accept the default name of the Serverid.xml file, then click the Export ID File button to generate the file and update the |

| | |
|---|---|
| File Name | following registry key:<br>HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Office Server\Groove\Groove Relay\Parameters<br><br>Remember where you save this file. You must specify the location of this file in the Groove Manager administrative Web interface so you can upload it to the Groove Manager server.<br><br>To identify the Groove Manager to the Groove Relay, you must copy the Groove Manager's registry key file (ManagementServer.reg) to the Groove Relay and install it in the local registry. Only Groove Manager servers whose registry keys are written to the Groove Relay can communicate with the Groove Relay. Successful upload of the ServerID file to Groove Manager and the writing of the Groove Manager registry file to the Groove Relay are necessary to enable and secure communication between the two servers.<br><br>Default: serverID.xml |

b. Once you have generated the SOAP private key and certificate files by clicking the Generate Files button and clicked the Export ID File button, click the Next button to continue to the Security tab.
c. Click the Finish button to complete the initial Groove Relay server configuration and exit the control panel.
d. A pop-up window appears and prompts you to back up the newly generated key files. Insert a USB drive or other removable media and click OK.

11. Start the Groove Relay server.
    a. Go to Start→Programs→Administrative Tools→Services.
    b. Right-click the service Groove Relay, and click Start.
    c. To test the server installation, open a browser and enter the URL http://localhost:8010/.
12. Add the Relay Server to the Groove Manager.
    a. From the Groove Relay server, open a browser, and enter http://server3-gs/gms/.
    b. On the navigation pane, click the domain Relay Server Sets heading.
    c. The Relay Server Sets tab appears with a list of relay server sets. The Groove Manager provides an initial default relay server set, which is empty if you have not added servers to the set.
    d. Click the Relay Servers tab.
    e. Click Add Server in the toolbar
    f. Select Onsite Relay Server for the Groove Relay.
    g. From the Add Relay Server page, click the Download Public Key button to download ManagementServer.reg. The File Download dialogue box appears. This .reg file contains the Groove Manager's certificate with its public key and identifying information.
    h. Select Save this file, and then click OK.
    i. Select a location for saving the file (c:\ drive).
    j. Click the Save button.
    k. Click the Close button.
    l. From the Groove Relay server, double-click the c:\ManagementServer.reg file to update the Groove Relay registry.
    m. From the Add Relay Server page on the Groove Manager, browse to the location of the Groove Relay ID file (serverID.xml) which you generated and saved to removable media above.
    n. Click OK to upload the Groove Relay ID file to the Groove Manager domain.
13. Restart the Groove Relay server.
    a. From the Relay server, go to Start→Programs→Administrative Tools→Services.
    b. Right-click the service Groove Relay, and click Restart.
    c. To test if the relay server is running, open a browser, and enter the URL http://localhost:8010/.
14. Configure the Groove Relay service startup and recovery settings.
    a. Go to Start→Programs→Administrative Tools→Services.
    b. Double-click Groove Relay.
    c. Set Startup type to Automatic.
    d. Go to the Log On tab, and make sure that Log on as: Local System Account is selected.
    e. Configure the Groove Relay service recovery settings options under Logon as: Local System Account by clicking the check box Allow service to interact with the desktop.
    f. Click the Recovery tab and enter the values in the following table:

| **Groove Relay Service Recovery Settings** | **Values** |
|---|---|
| First Failure | Restart the Service |

| | |
|---|---|
| Second Failure | Restart the Service |
| Subsequent Failure | Restart the Service |
| Reset Failure Count | 999 |
| Restart service after | 1 minute |

g. Click Apply, and then click OK.

15. Perform a full restart of the Groove Relay server.
16. When the server has finished booting, log in and verify that the Groove Relay service is running by opening a browser and entering the URL http://localhost:8010/.

## Appendix A – Test system configuration information

This appendix provides detailed configuration information about each of the test systems and the servers and client we used in the tests.

| System | AMD Athlon 64 X2 5200+ processor (2.6 GHz Dual-Core) on Asus M2NBP-VM CSM motherboard | Intel vPro with Intel Core 2 Duo processor E6700 (2.66 GHz Dual-Core) on Intel DQ965GF motherboard |
|---|---|---|
| **General** | | |
| Processor and OS kernel: (physical, core, logical) / (UP, MP) | 1P2C2L / MP | 1P2C2L / MP |
| Number of physical processors | 1 | 1 |
| Single/Dual Core processors | Dual | Dual |
| Processor HT Status | NA | NA |
| System power management policy | Balanced | High Performance |
| **CPU** | | |
| Vendor | AMD | Intel |
| Name | Athlon 64 x2 Dual Core | Core 2 Duo |
| Model number | 5200+ | E6700 |
| Stepping | 2 | 6 |
| Socket type and number of pins | AM2 | LGA775 |
| Core frequency (GHz) | 2.6 | 2.66 |
| Front-side bus frequency | 2000 MHz HyperTransport technology | 1066 |
| L1 Cache | 64 KB + 64 KB (per core) | 32 KB + 32 KB (per core) |
| L2 Cache | 2 MB (1 MB per core) | 4 MB (shared) |
| **Platform** | | |
| Vendor | ASUSTek | Intel |
| Motherboard model number | M2NBP-VM CSM | DQ965GF |
| Motherboard chipset | NVIDIA GeForce 6150 | Intel Q965 |
| Motherboard revision number | A2 | C1 |
| System/motherboard serial number | 0018F378D511 | BQGF63500GE9 / AAD41676-305 |
| Bios name and version | Phoenix Technologies, LTD 0301 | Intel CO96510J.86A.5493.2006.1102.1728 |
| BIOS settings | Setup default | Setup default |
| **Memory module(s)** | | |
| Vendor and model number | Corsair CM2X512A-6400 | Corsair CM2X512A-6400 |
| Type | PC2-6400 | PC2-6400 |
| Speed (MHz) | 800 | 800 |
| Speed running in the system (MHz) | 400 | 400 |
| Timing/Latency (tCL-tRCD-tRP-tRASmin) | 5-5-5-18 | 5-5-5-18 |
| Size | 1024 MB | 1024 MB |
| Number of memory module(s) | 2 x 512 MB | 2 x 512 MB |
| Chip organization (Single-sided, Double-sided) | Double-sided | Double-sided |
| Channel (Single/Dual) | Dual | Dual |

| | | |
|---|---|---|
| **Hard disk** | | |
| Vendor and model number | Seagate ST3808110AS | Seagate ST3808110AS |
| Size | 80 GB | 80 GB |
| Buffer Size | 8 MB | 8 MB |
| RPM | 7200 | 7200 |
| Type | SATA 300 MB/s | SATA 300 MB/s |
| Controller | NVIDIA nForce 430 | Intel 82801HR (ICH8) |
| Driver | NVIDIA 5.10.2600.822 | Intel 6.2.0.2002 |
| **Operating system** | | |
| Name | Microsoft Windows Vista Ultimate RTM | Microsoft Windows Vista Ultimate RTM |
| Build number | 6000 | 6000 |
| File system | NTFS | NTFS |
| Kernel | ACPI x86-based PC | ACPI x86-based PC |
| Language | English | English |
| Microsoft DirectX version | DirectX 10 | DirectX 10 |
| **Graphics** | | |
| Vendor and model number | NVIDIA Quadro NVS 210S | Intel GMA 3000 |
| Type (P=PCI Express, A=AGP 8X, I=Integrated) | I | Integrated |
| Chipset | GeForce 6150LE | Intel Q965 Express Chipset |
| BIOS version | 5.51.28.45.25 | 1377 |
| Memory size | 128 MB | 256 MB Shared |
| Resolution | 1280 x 1024 x 32 @ 60Hz | 1280 x 1024 x 32 @ 60Hz |
| Driver | NVIDIA 7.14.10.9677 | Intel 7.14.10.1111 |
| **Sound card/subsystem** | | |
| Vendor and model number | SoundMAX High Definition Audio | SigmaTel 92XX High Definition Audio |
| Driver | Microsoft 6.0.6000.16386 | Microsoft 6.0.6000.16386 |
| **Ethernet** | | |
| Vendor and model number | NVIDIA nForce Networking Controller | Intel 82566DM Gigabit |
| Driver | Microsoft 6.2.0.126 | Intel 9.6.8.0 |
| **Optical drive(s)** | | |
| Vendor and model number | Lite-On DVDRW SHW-160P6S | Lite-On DVDRW SHW-160P6S |
| Type (CD-ROM, CD-RW, DVD-ROM, DVD-RW) | DVD-RW | DVD-RW |
| Single/Dual layer | Dual | Dual |
| **USB ports** | | |
| Number | 6 | 8 |
| Type | USB 2.0 | USB 2.0 |
| **IEEE 1394 ports** | | |
| Number | 0 | 1 |
| **Monitor for single-monitor tests** | | |
| Model | Samsung SyncMaster 997DF | Samsung SyncMaster 997DF |
| Screen size | 19” | 19” |
| **Secondary monitor for dual-monitor test** | | |
| Model | Dell 2405FPW | Samsung SyncMaster 997DF |
| Screen size | 24” | 24” |

**Figure 13: Detailed system configuration information for each of the test PCs.**

| Server | HP Proliant DL320 1U Rack Server G3 (*Exchange server)* | HP ProLiant DL360 1U Rack Server G4p (*Active Directory/DHCP/DNS server)* |
|---|---|---|
| **General** | | |
| Processor and OS kernel: (physical, core, logical) / (UP, MP) | 1P1C2L / MP | 1P1C2L / MP |
| Number of physical processors | 1 | 1 |
| Single/Dual-Core processors | Single | Single |
| System Power Management Policy | AC/Always On | AC/Always On |
| **CPU** | | |
| Vendor | Intel | Intel |
| Name | Intel Pentium 4 650 | Intel Xeon |
| Stepping | 3 | A |
| Socket type | LGA775 | mPGA-604 |
| Core frequency (GHz) | 3.4 | 3.4 |
| Front-side bus frequency (MHz) | 800 | 800 |
| L1 Cache | 16 KB + 12 Kμops | 16 KB + 12 Kμops |
| L2 Cache | 2 MB | 2 MB |
| **Platform** | | |
| Vendor | HP | HP |
| Motherboard model number | 374295-405 | 382146-405 |
| Motherboard chipset | Intel E7221 Chipset | Intel E7520 Chipset |
| Motherboard revision number | A03 | A05 |
| Motherboard serial number | USE617N1VL | USE617N2DF |
| BIOS name and version | HP D18 | HP P54 |
| BIOS settings | Default | Default |
| **Memory module(s)** | | |
| Vendor and model number | Micron MT18VDDT12872AG-40BD1 | Infineon HYS72T128000HR-5-A |
| Type | PC3200 DDR | PC2-3200 DDR-2 |
| Speed (MHz) | 400 | 400 |
| Speed running in the system (MHz) | 200 | 200 |
| Timing/Latency (tCL-tRCD-iRP-tRASmin) | 3-3-3-8 | 3-3-3-11 |
| Size | 2048 MB | 2048 MB |
| Number of RAM modules | 2 | 2 |
| Chip organization | Double-sided | Double-sided |
| Channel | Single | Single |
| **Hard disk** | | |
| Vendor and model number | Maxtor 6L160M0 | Maxtor 6L160M0 |
| Number of disks in system | 1 | 1 |
| Size | 160GB | 160GB |
| Buffer Size | 8 MB | 8 MB |
| RPM | 7200 | 7200 |
| Type | SATA | SATA |
| Controller | Intel 82801FB (ICH6) | Intel 6300ESB (ICH-S) |
| Controller driver | Microsoft 5.2.3790.1830 | Microsoft 5.2.3790.1830 |
| **Operating system** | | |

| | | |
|---|---|---|
| Name | Microsoft Windows Server 2003 R2 Enterprise Edition | Microsoft Windows Server 2003 R2 Enterprise x64 Edition |
| Build number | 3790 | 3790 |
| Service Pack | SP1 | SP1 |
| File system | NTFS | NTFS |
| Kernel | ACPI Multiprocessor PC | ACPI Multiprocessor x64-based PC |
| Language | English | English |
| Microsoft DirectX version | 9.0c | 9.0c |
| **Graphics** | | |
| Vendor and model number | ATI Rage XL | ATI Rage XL |
| BIOS version | GR-xlcpq-5.882-4.333 | GR-xlcpq-5.882-4.333 |
| Type | Integrated | Integrated |
| Memory size | 8 MB shared | 8 MB shared |
| Resolution | 1024 x 768 | 1024 x 768 |
| Driver | ATI 5.10.2600.6014 | ATI 6.14.10.6025 |
| **Network card/subsystem** | | |
| Vendor and model number | HP NC7782 Dual-port Gigabit Server Adapter | HP NC7782 Dual-port Gigabit Server Adapter |
| Type | Integrated | Integrated |
| Driver | HP 9.52.0.0 | HP 9.52.0.0 |
| **Optical drive** | | |
| Vendor and model number | Teac DW-224E-C | HLDS GCR-8240N |
| Type | DVD-ROM/CD-RW | CD-ROM |
| **USB ports** | | |
| # of ports | 3 | 2 |
| Type of ports (USB 1.1, USB 2.0) | USB 2.0 | USB 2.0 |

**Figure 14: Detailed system configuration information for the Exchange and Active Directory/DHCP/DNS servers in our test configuration.**

| Server | Custom-built server (*Groove Relay server)* | HP ProLiant DL360 1U rack server G4p (*Groove Manager/SQL server)* |
|---|---|---|
| **General** | | |
| Processor and OS kernel: (physical, core, logical) / (UP, MP) | 2P4C4L | 1P1C2L / MP |
| Number of physical processors | 2 | 1 |
| Single/Dual-Core processors | Dual | Single |
| System Power Management Policy | AC/Always On | AC/Always On |
| **CPU** | | |
| Vendor | Intel | Intel |
| Name | Dual-Core Intel Xeon processor 5160 | Intel Xeon |
| Stepping | 4 | A |
| Socket type | LGA 771 | mPGA-604 |
| Core frequency (GHz) | 3.0 | 3.4 |
| Front-side bus frequency (MHz) | 1333 | 800 |
| L1 Cache | 32KB + 32KB | 16 KB + 12 Kμops |
| L2 Cache | 4MB (shared by 2 cores) | 2 MB |
| **Platform** | | |
| Vendor | Supermicro | HP |
| Motherboard model number | X7DB8+ | 382146-405 |
| Motherboard chipset | Intel 5000P Chipset | Intel E7520 Chipset |
| Motherboard revision number | 92 | A05 |
| Motherboard serial number | TM63S00221 | USE617N2DF |
| BIOS name and version | Phoenix Technologies 6.00 5/03/2006 | HP P54 |
| BIOS settings | Default | Default |
| **Memory module(s)** | | |
| Vendor and model number | Micron MT18HTF12872FDY | Infineon HYS72T128000HR-5-A |
| Type | PC2-4300 | PC2-3200 DDR-2 |
| Speed (MHz) | 533 | 400 |
| Speed running in the system (MHz) | 533 | 200 |
| Timing/Latency (tCL-tRCD-iRP-tRASmin) | 4-4-4-12 | 3-3-3-11 |
| Size | 8192MB | 2048 MB |
| Number of RAM modules | 8 | 2 |
| Chip organization | Double-sided | Double-sided |
| Channel | Dual | Single |
| **Hard disk** | | |
| Vendor and model number | Hitachi HDT722516DLA38 | Maxtor 6L160M0 |
| Number of disks in system | 2 | 1 |
| Size | 160GB | 160GB |
| Buffer Size | 8MB | 8 MB |
| RPM | 7200 | 7200 |
| Additional disk drive vendor and model number | Western Digital WD800GD | NA |
| Size | 80GB | NA |
| Buffer Size | 8MB | NA |

| | | |
|---|---|---|
| RPM | 10000 | NA |
| Type | SATA | SATA |
| Controller | Intel 631xESB Serial ATA | Intel 6300ESB (ICH-S) |
| Controller driver | Intel 7.4.0.1005 | Microsoft 5.2.3790.1830 |
| **Operating system** | | |
| Name | Microsoft Windows 2003 Server R2 x64 Enterprise Edition | Microsoft Windows Server 2003 R2 Enterprise x64 Edition |
| Build number | 3790 | 3790 |
| Service Pack | SP1 | SP1 |
| File system | NTFS | NTFS |
| Kernel | ACPI Multiprocessor x64-based PC | ACPI Multiprocessor x64-based PC |
| Language | English | English |
| Microsoft DirectX version | 9.0c | 9.0c |
| **Graphics** | | |
| Vendor and model number | ATI Rage XL | ATI Rage XL |
| BIOS version | GR-xlints3y.09a-4.332 | GR-xlcpq-5.882-4.333 |
| Type | Integrated | Integrated |
| Memory size | 8 MB shared | 8 MB shared |
| Resolution | 1024 x 768 | 1024 x 768 |
| Driver | ATI 6.14.10.6025 | ATI 6.14.10.6025 |
| **Network card/subsystem** | | |
| Vendor and model number | Intel PRO/1000 EB Network Connection | HP NC7782 Dual-port Gigabit Server Adapter |
| Type | Integrated | Integrated |
| Driver | Intel 9.5.12.0 | HP 9.52.0.0 |
| **Optical drive** | | |
| Vendor and model number | LITE-ON SOHC-5236V | HLDS GCR-8240N |
| Type | DVD-ROM/CD-RW | CD-ROM |
| **USB ports** | | |
| # of ports | 4 | 2 |
| Type of ports (USB 1.1, USB 2.0) | USB 2.0 | USB 2.0 |

**Figure 15: Detailed system configuration information for the Groove servers in our test configuration.**

| System | Collaboration client |
|---|---|
| **General** | |
| Processor and OS kernel: (physical, core, logical) / (UP, MP) | 1P1C1L / UP |
| Number of physical processors | 1 |
| Single/Dual-Core processors | Single |
| Processor HT status | N/A |
| System Power Management Policy | Balanced |
| **CPU** | |
| Vendor | Intel |
| Name | Celeron |
| Model number | 325 |
| Stepping | 1 |
| Socket type | Socket 478 |
| Core frequency (GHz) | 2.53 |
| Front-side bus frequency (MHz) | 533 |
| L1 Cache | 16 KB + 12 Kμops |
| L2 Cache | 256 KB |
| **Platform** | |
| Vendor | Dell |
| Motherboard model number | 0WF887 |
| Motherboard chipset | Intel 865G |
| Motherboard revision number | A2 |
| Motherboard serial number | 62XTH91 |
| BIOS name and version | Dell A00 |
| BIOS settings | Setup default |
| **Memory module(s)** | |
| Vendor and model number | MOSEL V826632K24SCTG-D3 |
| Type | PC 3200 |
| Speed (MHz) | 400 |
| Speed running in the system (MHz) | 166 |
| Timing/Latency (tCL-tRCD-tRP-tRASmin) | 2.5-3-3-7 |
| Size | 512 MB |
| Number of memory modules | 2 x 256 MB |
| Chip organization | Single-Sided |
| Channel | Dual |
| **Hard disk** | |
| Vendor and model number | Maxtor 6L160P0 |
| Size | 160 GB |
| Buffer Size | 8 MB |
| RPM | 7200 |
| Type | ATA 133 |
| Controller | Intel 82801EB (ICH5) |
| Driver | Microsoft 6.0.6000.16386 |
| **Operating system** | |
| Name | Microsoft Windows Vista Ultimate RTM |
| Build number | 6000 |
| File system | NTFS |
| Kernel | ACPI x86-based PC |

| | |
|---|---|
| Language | English |
| Microsoft DirectX version | DirectX 10 |
| **Graphics** | |
| Vendor and model number | Intel Extreme Graphics 2 |
| Type | Integrated |
| Chipset | Intel 865G |
| BIOS version | Intel Video BIOS |
| Memory size | 224 MB |
| Resolution | 1280 x 1024 x 32 bit @ 60Hz |
| Driver | Intel 6.14.10.4656 |
| **Sound card/subsystem** | |
| Vendor and model number | SoundMAX Integrated Digital Audio Device |
| Driver | Analog Devices 5.12.1.7000 |
| **Ethernet** | |
| Vendor and model number | Intel PRO/100+ PCI Adapter |
| Driver | 6.4.14.81 |
| **Optical drive(s)** | |
| Vendor and model number | Philips DVD-RW DVD8701 |
| Type | DVD-RW |
| Dual/Single layer | Dual |
| **USB ports** | |
| # of ports | 6 |
| Type of ports (USB1.1, USB2.0) | 2.0 |
| **IEEE 1394 ports** | |
| # of ports | 0 |
| **Monitor** | |
| Model | ViewSonic Optiquest Q7 |
| Screen size | 17” |

**Figure 16: Detailed system configuration information for the Collaboration client PC, which collaborated with the PC under test via Microsoft Groove and Microsoft Outlook.**

# Appendix B – Instructions for running the application scenarios

We evaluated the performance of each of the test systems on each of the application scenarios (see the Application scenarios section for more information on them) by hand-timing the tasks in those scenarios.

We collected results for five runs of each scenario in each system configuration. We refer in this paper only to the median results of those runs on each system configuration. Lower times to complete a given function indicate better performance. We round those times to hundredths of seconds in this report.

In the following instructions, we assume you have already completed all of the setup work in the Test Methodology section.

## Opening a compressed Outlook message attachment, an XML file, in Microsoft Word 2007 while a Groove workspace synchronization runs

### The applications involved

- Microsoft Office Outlook 2007
- Microsoft Office Word 2007
- Microsoft Office Groove 2007

### The data files involved

- vProC&P0806-XM.xml, a 9.64MB Word document within a 3.92MB compressed folder
- Project Photos, a 119MB folder with 50 JPEG images.
- Brochure.pdf, a 4.7MB PDF file
- Installation.doc, a 3.7MB Word document

### The test process

First, prepare each system by following these steps once:

1. Launch Microsoft Groove 2007 on the Collaboration client, which is the PC that will populate the Groove workspace.
2. On the Collaboration client, add Sheila Craig to Jenny Carlson's Contact list by performing the following steps:
   a. Click the Contacts tab in the Microsoft Groove Launch bar.
   b. Click the New Contact hyperlink. A Find User dialog box will open.
   c. In the Search For text box, type Sheila Craig's name.
   d. Click Find.
   e. Select Sheila Craig's name from the list.
   f. Click Add.
3. Create a Groove Workspace template on the Collaboration client by performing the following steps:
   a. Click the New Workspace link in the Workspaces section of the Microsoft Office Groove Launch bar.
   b. In the Create New Workspace dialog box that appears, type ACME Workspace Template in the Name of Workspace field, and select Standard, if it is not already selected.
   c. Click OK. The ACME Workspace Template Workspace will open.
   d. Click Add Tools in the Common Tasks area of the Microsoft Office Groove Launch bar in the bottom right-hand corner of the Workspace.
   e. Select all tools from the More Tools dialog box by placing a check next to each tool.
   f. Click OK.
   g. Select File→Save Workspace As→Template.
   h. Click the Save button in the Save As dialog box to save the template in the default location.
   i. Do not make any selections in the Template Options dialog box, and click OK.
   j. Close the ACME Workspace Template workspace after it launches.
4. Make five copies of the vProC&P0806-XM*n*.xml E-mail test document, where *n* is equal to the test run.
5. Create a compressed folder of the five XML test documents by performing the following steps: Right-click→Send To→Compressed (zipped) Folder.
6. Attach and send the five compressed XML test documents to Sheila Craig in five separate messages.

7. Launch Microsoft Office Outlook 2007 on the system under test to verify it has received the five test messages.
8. Close Microsoft Office Outlook 2007 on the system under test.

To execute the test, follow these instructions. You will need two stopwatches.

1. Create a test Workspace named IT Workspace on the Collaboration client by performing the following steps:
   a. Click the New Workspace link in the Workspaces section of the Microsoft Office Groove Launch bar.
   b. In the Create New Workspace dialog box that opens, select Template, and select ACME Workspace Template from the drop-down box.
   c. Type IT Workspace in the Name of Workspace field.
   d. Click OK. The IT Workspace will open on the Collaboration client.
2. Invite Sheila Craig to the IT Workspace by performing the following steps:
   a. Right-click IT Workspace in the Collaboration client's Microsoft Office Groove Launch bar.
   b. Select Invite to Workspace.
   c. A Send Invitation dialog box will appear.
   d. Select Sheila Craig/ACME from the To: drop-down box.
   e. Click the Invite button.
   f. A Groove alert will appear near the system tray on the system under test with a hyperlink stating Invitation for Sheila Craig/ACME from Jenny Carlson/ACME
   g. Click the link.
   h. In the Respond to Invitation dialog box, click Accept.
   i. Allow IT Workspace to sync on the system under test, as indicated by a Groove alert stating "IT Workspace ready (click to open)."
   j. Click this Groove alert to open the IT Workspace on the system under test.
3. Close the IT Workspace on the system under test.
4. Close Microsoft Office Groove on the system under test by selecting File→Exit. Click Yes when Groove prompts you.
5. Reboot the system under test.
6. Copy the test files into the Files (Root Folder) Tool in the IT Workspace on the Collaboration client.
7. When the file copy finishes, close Microsoft Office Groove on the Collaboration client by selecting File→Exit. Click Yes when Groove prompts you.
8. Log in to the system under test.
9. Wait 2.5 minutes to be sure the system has completed booting and is in a consistent starting state.
10. Launch Microsoft Office Outlook 2007 by clicking Start→E-mail—Microsoft Office Outlook.
11. Select the test message for this test run on the system under test.
12. Double-click the zip archive to open it.
13. Prepare both stopwatches.
14. On the system under test, simultaneously launch Microsoft Office Groove 2007 by clicking Start→All Programs→Microsoft Office→Microsoft Office Groove 2007 and start the first stopwatch. (On the system under test, Microsoft Office Groove will begin to sync with the IT Workspace information on the Groove Relay server.)
15. Highlight the vProC&P0806-XM*n*.xml document in the email message attachment on the system under test by clicking the file once.
16. When the Groove launch and sync has run for five seconds on the system under test, simultaneously press Enter to open the vProC&P0806-XM*n*.xml document and start the second stopwatch.
17. Stop the second stopwatch when the vProC&P0806-XM*n*.xml file-open completes (which is when the Word page count turns from gray to black in the Status Bar.
18. Record this time as the file-open test's result.
19. Microsoft Office Groove shows the progress of the sync in the Incoming data section along the bottom of its Launch bar. As the sync progresses, Microsoft Office Groove counts down to zero in megabytes as the content syncs on the system under test.
20. Stop the second stopwatch when the content sync countdown disappears.
21. Record this time as the Microsoft Office Groove sync test's result. Leave Microsoft Office Groove open.

22. Delete the IT Workspace by performing the following steps:
    a. Launch Microsoft Office Groove 2007 on the Collaboration client by clicking Start→All Programs→Microsoft Office→Microsoft Office Groove 2007.
    b. Right-click IT Workspace on the Collaboration client in the Workspaces area of the Microsoft Office Groove Launch bar.
    c. Select Delete→For All Members.
    d. Allow this deletion process to complete on the system under test before exiting Microsoft Office Groove.
    e. Reboot the system under test.
23. Repeat these steps four more times for a total of five runs.

We report the time, in seconds, that the XML file took to open from an email attachment. We also report the time, in seconds, that Microsoft Office Groove took to perform the synchronization of the workspace. Lower times indicate faster performance and so are better.

## Viewing data in Intuit QuickBooks Pro 2006

### The application involved

- Intuit QuickBooks Pro 2006

### The data file involved

- sample_product based business.QBB, a 7,036KB sample QuickBooks data file

### The test process

First, prepare each system by following these steps once to load the test QuickBooks database:

1. Launch Intuit QuickBooks Pro 2006.
2. Click File→Restore.
3. At the Restore Company Backup dialog box, select the radio button next to Disk, if that button is not already selected.
4. Click the Browse button.
5. Browse to the sample_product based business.QBB file, and click Open. This action returns you to the Restore Company Backup dialog box.
6. Click Restore.
7. Click Yes to confirm overwriting an existing company file.
8. Type YES in the field in the Delete Entire File dialog box, and click OK.
9. Click OK at the two subsequent QuickBooks Information dialog boxes.

To execute the test, follow these instructions. You will need one stopwatch.

1. Reboot the system under test.
2. Log in.
3. Wait 2.5 minutes to be sure the system has completed booting and is in a consistent starting state.
4. Double-click the Intuit QuickBooks Pro 2006 desktop icon.
5. Click Open to open the company file (sample_product based business.qbw).
6. Click OK to close the QuickBooks information dialog.
7. At the Register Intuit QuickBooks Pro 2006 screen, click Remind Me Later.
8. Click Window→Close All to close any open windows.
9. Select Favorite Reports from the drop-down list.
10. Prepare the stopwatch.
11. Simultaneously click Display and start the stopwatch.
12. Stop the stopwatch when all the report windows are open (pay particular attention to top left report).
13. Record this time as the test's result.
14. Click Window→Close All to close the reports before closing QuickBooks Pro to re-run the test.
15. Repeat these steps four times for a total of five runs.

We report the time, in seconds, that Intuit QuickBooks Pro 2006 took to load the reports. Lower times indicate faster performance and so are better.

## Recalculating business revenue using Microsoft Office Excel 2007

### The application involved

- Microsoft Office Excel 2007

### The data file involved

- Excel2minA.xls, a 447KB Excel spreadsheet

### The test process

First, prepare each system by following these steps once:

1. Copy the Excel2minA.xls test file to the desktop.
2. Launch Microsoft Office Excel 2007 by clicking Start→All Applications→Microsoft Office→Microsoft Office Excel 2007.
3. Click the Office Button.
4. Click Excel Options.
5. Click Trust Center.
6. Click Trust Center Settings.
7. Click Macro Settings.
8. Select Enable all macros (not recommended; potentially dangerous code can run).
9. Click OK to close the Trust Center.
10. Click OK to close Excel Options.

To execute the test, follow these instructions. You will need one stopwatch.

1. Reboot the system under test.
2. Log in.
3. Wait 2.5 minutes to be sure the system has completed booting and is in a consistent starting state.
4. Double-click the Excel2minA.xls file to open it.
5. Click the Outputs tab to open the Outputs Worksheet.
6. Wait 10 seconds after opening the file.
7. Prepare the stopwatch.
8. Simultaneously press F9 and start the stopwatch.
9. Stop the stopwatch when the recalculation percentage indicator reaches 100 percent and closes.
10. Record this time as the test's result.
11. Repeat these steps four times for a total of five runs.

We report the time, in seconds, that Microsoft Office Excel 2007 took to perform the recalculation. Lower times indicate faster performance and so are better.

## Running a Monte Carlo simulation in Microsoft Office Excel 2007

### The application involved

- Microsoft Office Excel 2007

### The data file involved

- AutoDealer.xls, a 1.5MB Excel spreadsheet

### The test process

First, prepare each system by following these steps once:

1. Copy AutoDealer.xls to the desktop.
2. Launch Microsoft Office Excel 2007 by clicking Start→All Applications→Microsoft Office→Microsoft Office Excel 2007.
3. Click the Office Button.

4. Click Excel Options.
5. Click Trust Center.
6. Click Trust Center Settings.
7. Click Macro Settings.
8. Select Enable all macros (not recommended; potentially dangerous code can run).
9. Click OK to close the Trust Center.
10. Click OK to close Excel Options.

To execute the test, follow these instructions. You will need one stopwatch.

1. Reboot the system under test.
2. Log in.
3. Wait 2.5 minutes to be sure the system has completed booting and is in a consistent starting state.
4. Double-click the AutoDealer.xls file to open it.
5. Wait 10 seconds after opening the file.
6. Prepare the stopwatch.
7. Simultaneously press F9 and start the stopwatch.
8. Stop the stopwatch when the Data Table indicator on the Status Bar goes away.
9. Record this time as the test's result.
10. Repeat these steps four times for a total of five runs.

We report the time, in seconds, that Microsoft Office Excel 2007 took to perform the recalculation. Lower times indicate faster performance and so are better.

## Viewing a slideshow while an HD video plays

### The applications involved

- Microsoft Windows Media Player 11
- Microsoft Windows Photo Gallery Slideshow

### The data files involved

- Robotica_1080.wmv, a 102MB video file
- Possible shoot location, a 119MB folder with 50 JPEG images

### The test process

First, prepare each system by following these steps once:

1. Set up the dual monitors.
   a. Connect a flat-screen analog monitor to the analog monitor output connector.
   b. Connect a flat-panel monitor to the DVI output monitor connector.
   c. Open the Graphics properties by right-clicking the desktop and choosing Graphics Properties.
   d. Set the digital monitor as primary.
   e. Set the digital monitor to 1600 by 900 resolution.
   f. Set the analog monitor as secondary.
   g. Set the analog monitor to 1280 by 1024 resolution.
   h. Click OK.

To execute the test, follow these instructions. You will need one stopwatch.

1. Reboot the system under test.
2. Login.
3. Wait 2.5 minutes to be sure the system has completed booting and is in a consistent starting state.
4. Double-click the Robotica_1080.wmv file to start the video on the analog monitor. While following the rest of the instructions, also watch the video and note any problems the system has playing it.
5. Right-click the video.
6. Select Full screen.

7. Open the 6MPelPhotos folder that contains the JPEG images.
8. Set the folder to List view.
9. Click slideshow.
10. Examine the slideshow transition for display problems, such as fade time, fade quality, and number of improper fades, and note all display issues.

We report all problems the system has while playing the video and displaying the slideshow.

Principled Technologies, Inc.
1007 Slater Road, Suite 250
Durham, NC 27703
www.principledtechnologies.com
info@principledtechnologies.com

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